

What is claimed is:

1. A semiconductor device having a photo diode comprising a first conductivity type semiconductor layer and a second conductivity type semiconductor layer formed at a surface layer portion of said first conductivity
5 type semiconductor layer, wherein:

the sensitivity of said photo diode to light of a first wavelength and the sensitivity to light of a second wavelength which is different from said first
10 wavelength are made to become substantially the same by designing a region in which a depletion layer spreads from a junction surface of said first conductivity type semiconductor layer and said second conductivity type semiconductor layer when inverse biases are applied to
15 said first conductivity type semiconductor layer and said second conductivity type semiconductor layer.

2. A semiconductor device as set forth in claim 1, wherein:

the sensitivity of said photo diode to light of
20 a first wavelength and the sensitivity to light of a second wavelength are made to become substantially the same by designing impurity concentrations and said inverse biases of said first conductivity type semiconductor layer and said second conductivity type
25 semiconductor layer and by designing said region in which

a depletion layer spreads.

3. A semiconductor device as set forth in claim 1,
wherein said depletion layer is designed to spread in a
region including a region 3 to 6 μm in the depth
5 direction from a surface of said second conductivity type
semiconductor layer.

4. A semiconductor device as set forth in claim 1,
wherein said depletion layer is designed to spread in a
region including a region 2 to 7 μm in the depth
10 direction from a surface of said second conductivity type
semiconductor layer.

5. A semiconductor device as set forth in claim 1,
wherein said first conductivity type semiconductor layer
is formed on a first conductivity type semiconductor
15 substrate containing a first conductivity type impurity
at a higher concentration than said first conductivity
type semiconductor layer.

6. A semiconductor device as set forth in claim 5,
wherein a surface concentration of the first conductivity
20 type impurity of said first conductivity type
semiconductor substrate is at least $1 \times 10^{17}/\text{cm}^3$.

7. A semiconductor device as set forth in claim 5,
wherein a distance between an end face of said depletion
layer at the first conductivity type semiconductor
25 substrate side and the surface of said first conductivity

type semiconductor substrate is 3 μm or less.

8. A semiconductor device as set forth in claim 1,
wherein

said first wavelength is 780 nm and

5 said second wavelength is 650 nm.

9. A semiconductor device comprising a first
conductivity type semiconductor substrate, a first
conductivity type semiconductor layer formed on a first
conductivity type semiconductor substrate and containing
10 a first conductivity type impurity at a lower
concentration than said first conductivity type
semiconductor substrate, and a second conductivity type
semiconductor layer formed at a surface layer portion of
said first conductivity type semiconductor layer,
15 wherein:

a photo diode is formed by spreading a
depletion layer from a junction surface of said first
conductivity type semiconductor layer and said second
conductivity type semiconductor layer when inverse biases
20 are applied to said first conductivity type semiconductor
layer and said second conductivity type semiconductor
layer, and

the concentrations of the impurity of said
first and second conductivity layers are adjusted so that
25 the depletion layer spreading region is made wherein the

09502377 071001

sensitivity of said photo diode to light of a first wavelength and the sensitivity to light of a second wavelength which is different from said first wavelength become substantially the same.

TOP SECRET